

## REMARKS

Drawings:

The accompanying drawings have been corrected pursuant to the comments of the examiner. Crosshatching patterns for the dielectric substrate and the filler material inside the through hole have been corrected on all of figures (Figure 1 to-12) pursuant to MPEP 608.02.

Upon indication of acceptability, formal drawings will be prepared incorporating the changes indicated.

Claims:

The new elements of amended claim 9 are supported by the specification as follows. The dielectric substrate is illustrated in the drawings as element 10 and discussed in the specification as originally filed at page 6 lines 15-20. The upper and lower surfaces are discussed in the originally filed specification as "opposite sides of the substrate" at page 6 lines 15-20 and are illustrated in the originally filed drawings. The plated through holes extending between opposite sides of the substrate are discussed in the specification as originally filed at page 6 lines 15-20 and illustrated in the drawings as element 12. That the through holes are landless is discussed in the originally filed specification at page 10 line 28 through page 11 line 14 and illustrated in the originally filed drawings. The diameters of the through holes and pads respectively are discussed in the specification as originally filed at page 10 line 29 through page 11 line 1, and illustrated in the originally filed drawings. The through hole extending from the upper to the lower substrate surface is discussed in the specification at page 6, lines 15 through 20, and illustrated in the drawings. The through hole inner surface plated with a conductive metal 14 is discussed in specification at page 7 lines 13 through 16, and is illustrated in the drawings. The through hole fill composition is discussed in the originally filed specification at page 7 lines 20 through 28, and is illustrated in the originally filed drawings. The smooth upper subcomposite surface formed by the fill composition, upper plating end and substrate upper surface is discussed in the specification at page 8 lines 3 through 13 and at page 9 lines 4 through 18, the smooth upper subcomposite surface also illustrated in the drawings.

With respect to claims 12-14, the conductive metal pad 44 plated onto the landless through hole inner plated surface and the fill composition is discussed in the originally filed

specification at page 10 line 14 through page 11 line 14 and illustrated in the originally filed drawings.

Claims 9-17 have been amended to identify the circuitry as a "first circuitry," said first circuitry being illustrated in the drawings as originally submitted and as previously amended. Claims 18-20 had been amended to identify the circuitry disposed on a top surface of the layer of dielectric material as a "second circuitry," responsive to the examiner's comments. The second circuitry electrically connected to the first circuitry through the at least one via his described in specification at page 11 lines 15 through 30, and is illustrated in the drawings as previously amended.

New claims 22-24 are supported in the specification at page 7, lines 20 through 28.

New claims 25-27 are supported in the specification at page 7, lines 16 through 20.

Accordingly, all of the claims amendments submitted herewith are believed to be fully supported by a specification and drawings as originally filed, and therefore do not destitute new the matter.

Claim objections.

Claim 21 has been canceled.

Claim Rejections – 35 USC § 112:

Claims 9-20 stand rejected under 35 USC § 112, second paragraph, as being indefinite. (As claim 21 has been canceled, it will not be addressed.) Specifically, the examiner has objected to "product-by-process" limitations appearing in claims 9 and 10. It is believed that the present amendments have eliminated the elements and the element language rejected by the examiner, and is believed that the claims 9 and 10 as presently amended are allowable under 35 USC § 112.

As amended, claim 9 claims a *first circuitry* having *circuit lines* which have a line width approximately equal to or less than the through hole first diameter. Claim 12 has been amended to state that the *first circuitry*, not the circuit lines, further comprises an upper conductive metal pad having a second diameter about equal to the first diameter. Amended claims 9 and 12 are now believed to be definite under 35 USC § 112, second paragraph.

Pursuant to the examiner's comments, claims 18-20 have been amended to clearly

identify a second circuitry disposed on a top surface of the layer of dielectric material. Claims 18-20 are now believed to be definite under 35 USC § 112, second paragraph.

Claim rejections – 35 USC § 103:

Claims 9-20 are rejected under 35 USC § 103(a) as being unpatentable over Jones et al (U.S. Patent No. 5,097,593) in view of Lan et al (U.S. Patent No. 5,906,042.)

The law is quite clear that in order for a claimed invention to be rejected on obviousness, the prior art must suggest the modifications sought to be patented; In re Gordon 221 U.S.P.Q. 1125, 1127 (CAFC 1984); ACS Hospital System, Inc. v. Montefiore Hospital, 221 U.S.P.Q. 929, 933 (CAFC 1984).

Amended claim 9. Amended claim 9 claims a printed wiring board comprising at least one filled plated through hole with an inner surface plated with a conductive metal plating and extending from the upper to the lower surface; and a first circuitry additively plated onto an upper subcomposite surface electrically connected to the plated through hole, the first circuitry further comprising circuit lines having a line width approximately equal to or less than the first diameter.

Neither Jones, nor Jones in view of Lan, provides these teachings. In particular, Lan does not teach that the inner surface of his through holes are plated at all, let alone from the upper surface to the lower surface of his substrate. Instead, Lan's through hole surfaces are unplated, and are electrically conductive solely by virtue of electronically conductive particles suspended within the fill material within the through holes. See the abstract of Lan.

Thus, it is clear that where the references cited do not teach the entire invention, either singly or in combination, then the modification which the invention represents must be suggested and motivated by some other reference through some objective teaching and cannot come from the application itself, which is not the case here. Therefore, since the prior art of record does not teach the structural limitations claimed with particularity by amended claim 9, amended claim 9 is believed to be allowable under 35 USC § 103(a) over the prior art of record.

Amended Claim 10. Amended Claim 10 is dependent upon, and therefore includes all the limitations of, amended claim 9, and is for the reasons discussed above believed to be allowable under 35 USC § 103(a) over the prior art of record.

Amended Claim 11. Amended Claim 11 is indirectly and directly dependent upon, and

therefore includes all the limitations of, amended claims 9 and 10 respectively, and is for the reasons discussed above believed to be allowable under 35 USC § 103(a) over the prior art of record.

Moreover, amended Claim 11 claims the additional limitations wherein the first circuitry has an *aspect ratio greater than about one*. Examiner has maintained his assertion that Jones teaches this limitation. However, the only support provided for this assertion are references within Jones wherein it is stated that circuit lines "can be added" and "can be put very close together." See Jones at column 4, lines 37-38, 47-48 and 63-64. It is clear that under unambiguous rules of English language construction neither of these references modifies the clear and absolute limitations that appear in Jones at column 5, lines 3-9: "Indeed lines as small as 2 mils wide and on 4 mils center can be employed in this invention." Thus Jones clearly states that a maximum aspect ratio of one can be practiced under the Jones reference. The examiner must provide another citation within Jones, or another reference to modify Jones, to objectively teach the limitation of an aspect ratio greater than 1, as it is clear that the rejection cannot be maintained if the teaching comes only from the applicant's invention itself. In Re Oetiker, 24 U.S.P.Q. 2nd 1443, 1445 (CAFC 1992). Thus the examiner's assertion is wholly unsupported by his citations to Jones, or by any reasonable or legally permissible application of the English language or its rules of construction. If the examiner continues to reject amended claim 11 responsive to an assertion that Jones teaches a first circuitry having an aspect ratio greater than about one, then the courtesy of a telephone interview with the undersigned is requested, who may be reached at 440-205-3600; alternatively, the intervention of the Supervisory Examiner on this issue is hereby requested.

Therefore, for these reasons and for the reasons established in applicants' responsive amendment filed on November 29, 2001, claim 11 is believed to be allowable under 35 USC § 103(a) over the prior art of record.

Amended Claims 12-14. Amended Claims 12-14 are directly and indirectly dependent upon and include all of the limitations of amended claims 9, 10 and 11 and are, therefore, for the above reasons not properly rejected under 35 USC § 103 over the prior art of record.

Moreover, applicant has pointed out with particularity in his prior Amendment of July 10, 2002 that Jones does not teach the pad structure claimed by amended claims 12-14. As established in all of the Jones figures (Figures 1a-1k and 2) and by his specification at column 2,

lines 47-52, his land 14 is much larger than the through holes 12, the "lands 14 formed around the plated through holes 12." Therefore the clear unambiguous language of the Jones reference, and the basic laws of geometry, require that the Jones land have a diameter greater than his through hole diameters, and cannot be "about equal to" the same.

Amended Claims 15-20, and new claims 22-27.

Amended Claims 15-20, and new claims 22-27 are directly and indirectly dependent upon and include all of the limitations of amended claims 9, 10 and 11 and are, therefore, for the above reasons not properly rejected under 35 USC § 103 over the prior art of record.

In conclusion, the claims as amended and newly submitted are now believed to be in condition for allowance over the prior art of record.

Respectfully submitted,

  
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Enclosures